REMARKS – General

By the above amendment, Applicant has amended the title to emphasize the novelty of the invention.

Also, applicant has rewritten all the claims to define the invention more particularly and distinctly so as to overcome the technical rejections and define the invention patentably over the prior art.

The Objection To The Claim Rejection Under 35 USC § 112

The last O.A. rejected the Claims 1-6. Claim 1-6 have been rewritten. Applicant requests reconsideration of this rejection.

The References And Differences Of The Present Invention Thereover

Applicant will discuss the reference and the general novelty of the present invention and its unobviousness over the reference.

Volz [US 5,378,169] creates a pivotal connector for planer electronic device. Volz mounts connector assembly (col. 3, 15) over mother board 12. However, because the base assembly 18 contain the ground shielding member 64, formed from a sheet metal (col. 4, 5). Obviously, special electrical isolation is need between the ground shield member 64 and the mother board 12, if not, then there is high potential of electrical short among the components on the mother board surface and the ground shielding member 64. Further, a shield expansion zone 64, is a isolated shield housing module. Thus, Volz provides a solution of plurality shielded housing modules in sequentially connecting one another.

However, these housing modules are mounted sequentially connecting via special connectors 78, 79.

The applicant's current invention provides a computer mother board comprises a plurality of on board PCB shielding zone, which also provide as a shielding mate base of the metallic shielding housing cover of the expansion daughter board. There is not additional ground shied member (refer to Volz 64) needed.

Gessaman [US 5,559,676] provides an individual drop-in component 2 which may be attached by surface mount connection techniques to a circuit board 44 as described (col.5, 54). Gessaman's metallic cover provides the EMI shield for the electrons in side. However, Gessaman only provide the shield for a specific print circuit board 4. And the cover 8 needed to be assembled together with the print circuit board 4 to become an electronic assembly, which can be soldered on to the circuit board 44. Gessaman provides a EMI shield above the circuit board 4. The circuit on the circuit board 4 also emits electro-magnetic radiation downward. There no shield provided by Gessman for downward EMI from the circuit board 4. Gessaman dose not provide complete shield to circuit board.

Higgins, III [US 5,639,989] provides a method of utilizing a particulate-filled polymer system as an EMI shied for a circuit board (col.3, 66). However, this method needs a special coating process in order to apply the said particulate-filled polymer on to the circuit board. Obviously, complicate material and material processing equipment and facility are needed accordingly. When there is repair, modify, or adjustment, the coating will be destroyed and recoating is needed. Further, the coating may cause the circuit board difficult to be repaired or beyond repairable.

Volz And Gessaman Do Not Contain Any Justification To Support Their Combination, Much Less In The Manner Proposed

With regard to the proposed combination of Volz with metallic material suggested by Gessaman, it is well know that in order for any prior-art reference themselves to be valily combined for use in a prior-art § 103 rejection, *the references themselves* (or some other prior art) must suggest that they be combined. E.g., as was stated in In re Sernaker, 217 U.S.P.Q. 1.6 (C.A.F.C. 1983):

> "[P]rior art references in combination do not make an invention obivious unless something in the prior art references would suggest the advantage to be derived from combining their teachings."

That the suggestion to combine the references should not come from applicant was forcefully stated in Orthopedic Equipment Co. v. United States, 217 U.S.P.Q. 193,199 (CAFC 1983):

> "It is wrong to use the patent in suit [here the patent application] as a guide through the maze of prior art references, combining the right references in the right way to achieve the result of the claims in suit [here the claims pending]. Monday morning quarterbacking is quite improper when resolving the question of nonobviousness in a court of law [here the PTO]."

As was further stated in Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 U.S.P.Q.2d 1434 [C.A.F.C. 1988], "[w]here prior-art reference require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. .... *Something in the prior art must suggest the desirability and thus the obviousness of making the combination.*"[Emphasis supplied.]

In line with these decisions recently the Board stated in Ex parte Levengood, 28 U.S.P.Q.2d 1300 [P.T.O.B.A.&I. 1993]:

"In order to establish a *prima facie* case of obviousness, it is necessary for the examiner to present *evidence,* preferably in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art *would have been led to* combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention. ... That which is within the capabilities of one skilled in the art is not synonymous with obviousness. ... That one can *reconstruct* and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the reference to make the claimed invention. ... Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a *prima facie* case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that 'would lead' that individual 'to combine the relevant teachings of the references.' ... Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done."

In the present case, there is no reason given in the last O.A. to support the proposes combination.

The O.A. Noted [p.4] to use metallic material for the cover of Volz et al., as suggested by Gessaman for the purpose of protecting against EMI interference.

Applicant submit that the fact that combination produces advantages militates in favor of *applicant,* because it proves that the combination produces new and unexpected results and hence is unobvious.

As stated in the above Levengood case,

> "That one can *reconstruct* and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning dose not afford the basis for an obviousness conclusion unless that logic and reason also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention."

Applicant therefore submits that combining Volz and Gessaman is not legally justified and is therefore improper. Thus the applicant submits that the rejection on these references is also improper and should be withdrawn.

Applicant respectfully request, if the claims are again rejected upon any combination of references, that the Examiner include an explanation, in accordance with M.P.E.P § 706.02, Ex parte Clapp, 27 U.S.P.Q. 972 [P.O.B.A. 1985], and Ex parte Levengood, supra, a "factual basis to support his conclusion that it would have been obvious" to make the combination.

Even If Volz And Gessaman Were To Be Combined In The Manner Proposed, The Proposed Combination Would Not Show All Of The Novel Physical Features Of Claim 7

Neither Volz nor Gessaman create a direct mother board mounted shield EMI housing. Volz need a special connector and form the special sub unit Fig 2 to 8 in order to accomplish the sequentially connecting. Gessaman needs to make a cover 8 specifically shaped to circuit board 4, and then solder the assembly on to the other circuit board 44. Further more, Neither Volz nor Gessaman create a direct mother board mounted shield EMI housing with heat conducting apparatuses and use the shield housing as main part of heat conducting element as well as provides the EMI shielding for the electronic components inside. Further, the current invention is capable to accommodate different type/size of daughter board, as long as the daughter board has the proper connector that can mate with the connector in the on PCB shield zone, and the size of the daughter board can be fitted inside the shield zone.

Thus applicant submit that their invention is not capable to accomplish both EMI shielding and heat conduction for different type/size of expansion board and that claim 7 &10 clearly recite novel physical matter which distinguished over any possible combination of Volz and Gessaman.

The Novel Physical Features Of Claim 7, 10 Produce New And Unexpected Results And Hence Are Unobvious And Patentable Over These References Under § 103

Also applicant submit that the novel physical features of claim 10 are also unobvious and hence patentable under § 103 since they produce new and unexpected results over prior arts, or any combination thereof.

These new and unexpected results are the ability of applicant's apparatuses to accommodate and provide EMI shield and heat conducting for different type/size of daughter board. There no complicated special mold and material needed.

Applicant's apparatuses therefore are vastly superior to that of either Volz and Gessaman and Higgins of any possible combination thereof. There novel features of applicants apparatuses which effect these differences are, as stated, clearly cited in claim7 and claim10

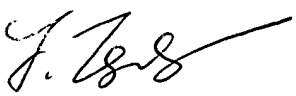
Conclusion

For all of the above reasons, the applicant submits that the specification and claims are now in proper form, and that the claims all define patentably over the prior art. Therefore he submits that this application is now in condition for allowance, which action he respectfully solicits.

Conditional Request For Constructive Assistance

Applicant has amended the specification and claims of this application so that they are proper, definite, and define novel structure which is also unobvious. If, for any reason this application is not believed to be in full condition of allowance, Applicant respectfully request the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 2173.02 and § 707.07(j) in order that the undersigned can place this applicant in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,



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Date: 2004 AUG 30

Patent Application of Franklin Zhigang Zhang

for

TITLE: [[Expandable Computer Board with Dual Shield Housing Solutions]]
Computer Board with Dual Shield Housing And Heat Sink Expansion Zone Apparatuses

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of the Provisional Patent Application Ser.No. 60/256,414 filed 12/18/2000.

BACKGROUND – FIELD OF INVENTION

This invention is concerned with a computer system board, specifically a computer system board with dual shield housing solutions for critical environment applications.

BACKGROUND – DESCRIPTION OF PRIOR ART

It is known in the art of the regular Personal Computer (PC) and industrial PC system board design, expansion slots are one of the key mechanisms on the board. They provide the hardware expandability of the system board. On a regular PC system board, ISA, PCI or PCMCIA slot can always be found. PC-104's interfaces were introduced to be the main expansion standard for stackable industrial PC. To expand hardware applications, you can simply insert the compatible add-on cards into the slots on the system board. There is no [[strictly]] strict requirement on the size of a regular PC system board. Electronic components always generate heat and EMI. In the prior art of the PC, in order to eliminate the interference and get better heat dissipation, certain spacing and size is required. To avoid EMI or heat issues, the system board is usually designed in bigger size. But when the size of equipment is limited, the size of system board is therefore limited. Thus [[the interactive interference between the]] the interference among the system board and the expansion boards increases. Whole system became unstable, if no interference proof means is implemented.

When applying a system in a particular space limited application, it's hard to shield the electromagnetic wave interference and dissipate the heat among the boards. So, regular design PC cannot be used in many applications, which need to meet the requirements of critical environment. They may cause malfunction of the system for the time being.

Furthermore in some special applications, the interference among the expansion boards and the system board is very strong because of one or more radio frequency circuit boards involved. If there is not proper shield among the system board and the expansion boards, the system even cannot work.

Obviously, better solution is needed.

Summary

[[The present invention provides the solutions which can get excellent system board expandability in a limit space. The computer board is designed for critical application circumstance]] The present invention provides a computer system board with dual shield and heat sink expansion for limit space and critical application circumstance. [[On this board, there is plurality of shield expansion houses.]] The shield expansion houses provide EMI shield and heat conduct for the daughter board inside. The shield expansion housing solutions comprise ~~an expansion zone~~ an on PCB expansion zone, and a special shield metal housing cover with heat sink that covers the whole expansion zone after an expansion board is installed on to the system board. The expansion zone is a large ground plate of the PCB with connectors, which can connect with the add-on expansion board.

The shield metal [[housing cover as long as the shield]] housing cover and the on PCB shield expansion zone works together to conduct the heat generated by the expansion board sealed inside, and, also shields the electromagnetic wave interference between the expansion board and outside house. In my example, dual shield expansion housing design with high heat sink especially eliminates the cross RF interference under the situation when there are two expansion boards doing radio frequency applications which are installed on to the system.

Objects and Advantages

Accordingly, several objects and advantages are achieved by providing shield expansion houses on the system board of my invention:

1) to provide highly stable and reliable applications of a computer system board in a limited space by the shield expansion housing solution of current invention;

2) to use the shield metal housing cover as well as the heat sink to provide high heat dispatching capability for the expansion board;

3) to shield the electromagnetic wave interference among the expansion board and the system board.

The forgoing features and advantages of the present invention can be appreciated more fully from the following description, with references to the accompanying drawings in which.

Brief Description of the Drawings

Fig. 1 is a diagrammatic view of a system board design with the present invention.

Fig. 1A is a cut away side view of the system board taken along line A-A of Fig.1; and the side view of the expansion board, the shield metal housing cover and the add-on extra heat sink.

Fig. 2 is an enlarged view of the shield metal housing cover and the expansion board.

DESCRIPTION-Preferred Embodiment

Fig. 1 is a diagrammatic view of a system board design with the present invention. As shown in this embodiment, the computer system board 10 comprises a PCB 13, a processor 14, the connector 16 (optional), other ICs 15,17 ~~and expansion~~ and on PCB expansion zones 11 & 12. The connector 16 makes it possible for the system level expansion with other system boards (not shown). Through this connector 16, more system boards can be stackable, thus it allows more expansion boards to fit into a particular space and can process more applications.

On the system board 10, two on PCB shield expansion zones 11, 12 comprise shield areas 112, 122 which are part of ground copper clad laminate on the PCB with insulation; soldering zones 111&121, which can be soldered together with a shield metal housing cover (referring to Fig.2 the shield metal housing cover 20); and expansion connectors 113, 123. Once the shield metal housing cover 20 is mounted on to the shield expansion zone 11 or 12, they can form a complete shield house with heat sink feature. The expansion boards connecting with the system board through the expansion connectors 113 or 123 process the according applications while they are isolated from electromagnetic wave interference with the electronics outside the house. Meanwhile, electronics sealed inside the house have a good heat distribution environment.

Fig. 1A is a cut away side view of the system board taken along line A-A of Fig.1; and the side view of the expansion board, the shield metal housing cover and the add-on extra heat sink. As shown, the expansion board 21 with connector 212 can be plugged into the expansion connector 123 and mounted on to the system board 10. The components 215 & 216, which need high heat distribution, have the heat conductor blades 213 &214 on them. After the expansion board 21 is mounted on the system board 10, the shield metal housing cover 20 can cover the shield expansion zone 12 and be mounted on the system board also. The heat conductor blades 213 and 214 touch the shield metal housing cover 20 and conduct the heat from the IC 215 and 216; thus, the shield metal housing cover 20 becomes the heat sink of the whole expansion board. For heavy duty expansion board, which may generates more heat, [[add-on extra heat sink 22 can be attached on to]] an add-on, extra heat sink 22 is attached to the shield metal housing cover 20 to provide extra heat distributing ability for the expansion board.

Fig.2 is an enlarged view of the shield metal housing cover and expansion board. As shown in this embodiment, the shield metal housing cover 20 is an open metal box with four small soldering edges 201,202,203 and 204, which can be soldered on to the soldering zone (referring to 111 or 121 of Fig. 1) of the system board 10. This forms the complete shield house for the expansion board 21. In some special cases, there may

be holes need on the shield metal housing cover in order for some of the circuit of the expansion board 21 to extend out of the shield metal housing cover. The expansion board 21 is an individual electronic circuit board, which can perform certain functions; for instance, a LAN card to provide networking functions for the system board. The expansion board 21 comprises a PCB 211 and a connector 212 that can be connected to the expansion connector (referring to 113 and 123 of Fig.1) in the shield expansion zone (referring to 11 and 12 of the Fig.1). Once the expansion board is sealed in to the shield house, the airflow inside the house is the heat conductor for all the components. On the PCB 211, there are ICs 215,216,217,and 218. [[Some of them (215 and 216) need heat sink to make sure they work normally. So the heat conductor blades 213 and 214 are added on to them 215 & 216 to provide better heat distribution.]] Heat conduct blades 213 and 214 are added on to IC 215 & 216 to provide better heat distribution. An add-on extra [[heat sink 22 can always be added]] heat sink 22 is added on to the shield metal housing cover 20 when better heat distribution is required.

Conclusion, Ramifications, and Scope

Accordingly, the reader can see, I've provided a computer system board with dual complete shield expansion housing solutions. With the PCB structure of the current invention, the complete system board has more compact space and whole system is easier to fit into smaller space. With the shield expansion housing solution of the current invention, more applications can be processed reliability and stably on the system board with no interference as well as good heat dissipation. Dual shield expansion housing design especially benefit to eliminate the cross interference with high heat sink ability under the situation when there are two radio frequency application expansion boards installed on to the system board.

Although the description above contains much specificity, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. Various other embodiments and ramifications are possible within it's scope. For example:

•For stackable system board, it allows more expansion boards to fit into a particular space and can process more applications.

•One system board can be designed with ~~more than one shield~~ more than two shield expansion zones.

•[[Additional heat sink may be necessary for the expansion boards, which generate high heat.]]

•A system board may comprise multiple expansion zones on both side of the PCB.

•A system board may comprise different size of the expansion zone.

•For special type of expansion boards, an expansion zone may comprise more than one connector and other means to joint the expansion boards with the system board.

•A shield expansion housing solution may have some holes conducting circuit from inside to outside.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

Claims: What is claimed is:

1-6 (canceled)

7.(new) A computer system board with a plurality of shield expansion housing apparatuses for add-on expansion daughter board comprises:

a computer system board with plurality of on PCB shield zone

a plurality of shield expansion housing cover

8.(new) The on PCB shield zone of claim 7 is a ground shield copper plate PCB area with solder able surrounding zone where the said shield expansion housing cover can be solder on to.

9.(new) The shield expansion housing cover of claim 7 is a metallic cover box with an open base that can be solder on to the solder able surrounding zone of claim 8.

10. (new)An apparatus of conduct heat from high heat generate electronics on the said expansion daughter board to shield expansion zone comprises:

a on PCB shield zone of claim 7

a expansion daughter board attached in to the connector/s within the said on PCB shield zone

a metallic shield expansion housing cover soldered on the said on PCB shield zone

plurality of heat conduct material mounted between and contact the daughter and

the said on PCB shield zone and the inside of the said metallic shield expansion housing cover

Heat conduct means on top of the said metallic shield expansion housing cover

Abstract:

A compact computer system board 10 comprises ~~dual shield~~ dual on PCB shield expansion zones 11, 12, expansion connectors 113, 123 which can be connected to expansion boards. Once a expansion board is connected to the expansion connector 113 (123) ~~in the shield~~ inside the on PCB shield expansion zone 11 (12) to extent the application of the system 10, ~~the shield metal housing cover~~ the metallic shield housing cover 20 will be mounted above the shield expansion zone 11(12). The shield expansion house formed ~~by shield expansion zone~~ by the on PCB shield expansion zone 11(12) and shield metal housing cover 20 isolates the electromagnetic interference between expansion board and the outside surrounding. [[The shield metal housing cover 20 as well as the shield expansion zone 11 (12) is the heat sink of the expansion board inside.]] The metallic shield housing cover 20 and the on PCB expansion zone 11 (12) function as the heat sink for the expansion board inside. The shield expansion housing solutions ~~guarantee~~ ensure the system processing high reliability and stably in the limited space of the system board. Dual expansion housing solutions especially eliminate the cross interference with high heat sink ability under the situation when there are two radio frequency application expansion boards installed on to the system board.